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C. C. Powning Editor & Proprietor

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NEVADA AGRICULTURE.

The Investigation of the Interdependence of Plant Life and Climatic Conditions of Nevada—Prof. Miller in Bulletin No. 2.

By the recent Act of Congress in the passage of the Hatch Bill, which provides for the financial assistance of State Agricultural Experiment Stations that were established at that time, or were thereafter to be established, the Board of Regents of the Nevada State University was encouraged in the establishment of the Nevada State Agricultural Experiment Station. In the organization of the Station, the writer was elected to the office of Botanist and Chemist, and, in addition to the duties thereby implied, had also assigned to him the directing of the labor of taking observations on the weather and soil temperature, and the collecting of meteorological data that would truly and fully present the climatic conditions of he State and Station, in so far as they might relate to the art of agriculture.

In the work of an Agricultural Experiment Station, a definite knowledge must be had of the meteorological conditions under which certain observations have been made or certain experiments have been performed, if they would be given true and lasting value. Results thus obtained are not simply locally important, but have an absolute and general worth.

Not only for this reason should definite knowledge of the meteorological conditions be known, but also that the results obtained by other stations may be appropriated without waste.

All stations must recognize the fact that all are working to a common end, not each wholly independent of the others, but each a part of the single whole. Economy must be practiced; energy must not be wasted; results must not be deferred.

In regions that have long been settled much preliminary work of this nature has been done. In a new country, like that of the State of Nevada, all remains to be tried and determined.

Again, not only is there no definite and complete knowledge of meteorological conditions; but also, a great lack of real knowledge of the habits and properties of the native plants, a full knowledge of which is so essential in determining what plants may be introduced and cultivated with success. The agricultural resources of the State are unknown, and they will remain so for many years unless a systematic investigation of its meteorological conditions and plant-life be made. Hap-hazard trials and guessing have shown that alfalfa, Medicago sativa, with moderate irrigation, is an invaluable forage plant which, where water may be had, may never be displaced. But what shall be grown on the extended fertile lands that may be made to receive but the light fall of rain and snow? Methodical examination, study and trial must be resorted to.

The Board of Regents has made a very liberal appropriation for meteorological apparatus and soil thermometers, which, when secured, together with such instruments as are now possessed through the courtesy of the Nevada State Weather Service, will put the Station in condition for taking very complete and reliable records.

A very substantial thermometer shelter has been erected after the general plan presented in Extract No. 26, from the Annual Report of the Chief Signal Officer of the United States Signal Service for 1886 and General Orders No. 3, of January 12, 1885, at a cost of about $175.

Both the shelter and support were built much stronger than directed, and were slightly modified to suit the local conditions. It was placed about seventy feet northwest of the main University building, safely anchored to sustain the greatest pressure of winds, and thoroughly painted.

A sliding frame, carrying the thermometers, may be pushed back and forward, giving them, when in the back part of the shelter, a position in the path of a vertically circulating current of air coming from a door in the floor, and passing up and over an inner false roof that is placed six to nine inches below the double roof.

The maximum, minimum, wet-bulb and dry-bulb thermometers were made by H. J. Green, of New York City, and were furnished with certificates of correction by the United States Signal Service.

A three-inch rain gauge and apparatus for determining the rate of evaporation, in addition to these thermometers, complete the list of instruments that are used at present in taking observations.

In addition to these instruments, it has been decided to secure a six-tenths inch bore standard barometer; an aneroid barometer, capable of taking altitudes to 20,000 feet above the sea; a set of maximum, minimum, wet-bulb and dry-bulb thermometers; a Draper thermograph; two standard fifty square inch rain gauges; a Robinson anemometer, with Gibbon's recording apparatus; a self-recording windvane; a water thermometer; a standard thermometer; a sunshine recorder; and a set of eighteen soil thermometers, of which those for one, three, six, nine, twelve and twenty-four inches, respectively, will be in duplicate, the remaining thermometers being adapted to take soil temperatures at depths of three, four, five, six, seven and eight feet, respectively.

A complete set, ranging from one inch to eight feet, will be placed in the open uncultivated ground that is not irrigated, and the duplicate set will be placed in an alfalfa field.

With this last set it is hoped that the influence of cultivation and irrigation upon the temperature of the native soil of the Station may be shown. The rain gauges will be placed, one at the surface of the ground at the Station, another on the University building, and another on a neighboring foot-hill. This disposal of the rain gauges will be made to determine the variation rainfall at different elevations. Contrary to common evidence, it is expected to be shown that the greater amount will be found to have been deposited in the higher gauge. This is expected because of precipitation so frequently occurs when the relative humidity is less than fifty per cent. At a later date, it is intended to establish observing stations on the mountain sides for taking rainfall, relative humidity and maximum and minimum temperature.

It is reported that frost occurs less frequently on the mountain sides and foothills than in the valleys. If this be found true, it is hoped that favorable localities for orchards and small fruits may be determined.

After a long series of observations at these sub-stations, data will be at hand to determine the influence of an increased extent of cultivated land and vegetation upon the climatic conditions of the region.

The mountains are being denuded of their forests, and trees are being planted in the valleys and foot-hills. It is predicted that the results following these changes, the development of the region, will be the reverse of the results observed in the Eastern States—the humidity and rain-fall will increase and be followed by a more extended and more vigorous vegetation.

But little meteorological data has been collected in the State, the most complete record having been made by Mr. C. W. Friend, of Carson City, Director of the Nevada State Weather Service, to whom I am indebted for the data which has been collected and presented in the accompanying tables.

Carson City is situated about thirty miles south of the Experiment Station, and is about seventy feet higher.

Table No. 1, gives a summary of the meteorological record for eight years, 1880 to 1887 (inclusive), and presents the following striking features:

The warmest month is August, July being next.

The maximum temperature occurs near the middle of the month.

The coldest month is January, February being next.

The minimum temperature occurs near the end of the month.

The greatest daily range of temperature occurs in August, and the least in December.

The mean temperature of the month of May is 0 3 deg. higher than the temperature of the year.

The mean temperature of October is 2.0 deg. lower than the mean temperature of the year.

This shows a short, cool Summer, and a long warm Winter.

The mean annual range of temperature is 102.3 deg.

The mean monthly range of temperature is 57.88 deg.

The mean daily range of temperature is 32.0 deg.

The highest observed temperature in the eight years is 101.0 deg., and occurred in the month of May in 1887.

The lowest observed temperature of the eight years was —18 0 deg. and occurred in the month of February in 1884.

The extreme range of temperature for the eight years was 119.0 deg.

The greatest monthly range of temperature was 79.0 deg. and occurred in the month of May 1887.

The mean relative humidity is but 53.7 deg.

The greatest precipitation occurs in December and January, being, respectively, 2.04 and 2 01 inches

The least precipitation occurs in August, September and July, being respectively, 0.11, 0.18 and 0.27 inches.

The mean precipitation for the month of May is but 0.31 inches.

The mean precipitation for the year is but 11.29.

Frosts are liable to occur in any day in the year.

The month of August is the only month of the year in the last eight years in which one year or another, the temperature has not fallen below the freezing point of water.

Table No. II gives a list of places in North America (Loomis Text Book on Meteoroloogy) that have, in the months and seasons designated, a mean temperature that closely approximates the mean temperature of Carson City. The names of the places are arranged in the order of the relative closeness of their approximation in temperature between Carson City and Halifax in the months from May to December, and that of Carson City and Baltimore, in the months from December to May.

It is also notable that the mean annual temperature approximates that of New Haven and Boston.

Table No. III compares the mean monthly and seasonal and annual temperatures of Carson City, Halifax and Baltimore, presenting interesting and surprising facts.

Table No. IV is a summary of the meteorological record for the months of October, 1887, to May, 1888, (inclusive) as observed at Reno, Nevada, by Mr. C. Mr. Fassett.

The lowest temperature recorded was —13 2 deg. The total rainfall for the eight months was 5.58 inches. The total depth of measured snow was 21.7 inches.

At this point it is also noted that the total rain-fall and melted snow at Reno for the year 1887, as observed by Surveyor-General C. W. Irish and Mr. S. G. Kendall, was 11.03 inches.

Table No. V is the complete record for the month of May, 1888, as observed by the writer, assisted by Mr. S. G. Kendall.

All readings were corrected for instrumental error, but in determining the dew point and relative humidity, no corrections were applied for altitude. The interesting fact is noted that at 2 P. M. on the fourteenth, the relative humidity was but 29.0 per cent, while at 2:30 P. M. a light rain shower was observed.

Now, with climatic conditions so different from those of the Eastern States, may we not also expect to find in the State of Nevada a peculiarly characteristic flora.

The deficiency of moisture and the high rate of evaporation are the elements of the climate which vary most extremely from that of the region east of the Rocky Mountains, and in the effort of the adjustment of native plant life to these conditions, is found the origin of the marked variation in the physiological and structural characteristics of our flora.

The absence of trees and succulent herbs, the presence of low and contorted shrubs, and the ever prevailing color of sage green, give to the landscape an originally characteristic appearance.

Regardless of the morphological relationship, the plants of the region may be classified from two points of view; first, with respect to the locality (varying with the temperature, altitude and amount of moisture) in which they occur; and, second, with respect to the means by which the plants of particular species adjust themselves to the general meteorological conditions of the whole region, namely, high rate of evaporation and deficiency of moisture.

In the first point of view they have been classified by Watson, in his report to Clarence King, Director of the Geological Survey of the Fortieth Parallel into: (1) the valley of flora, which includes, (a) alkaline species, (b) aquatic species, (c) species of the drier valleys and foot-hills; (2) mountain flora.

From the second point of view they may be classified into: (1) Plants which present a small extent of surface in proportion to their volumes, usually wanting in leaves; (2) plants that have deep growing rhizomes or tubers and a relatively small extent of exposed surface; (3) plants growing from deep bulbs or corms, and having a relatively small extent of exposed surface; (4) perennial plants that have long and diverging roots which take up the deep underground moisture; (5) plants that are shrubby, have large root expansion, small extent of leaf surface and a peculiar glaucous or pubescent surface which gives the plants of the region their characteristic sage green color; (6) small evanescent annuals that germinate, flower, ripen their fruit, produce many seeds and die, in the early Spring.

It is evident the plants belonging to the sub-division, aquatic and meadow species, according to the first classification, do not permit of classification in respect to the second point of view; and again, plants occurring in different classes according to the second classification, may possess common structural characteristics that fit them for the survival of the species. One property especially that may be possessed by plants in all classes, is the pubescent or glaucous surface. The microscopical and physiological experimentative investigation of the leaves and stems of plants having this property, promises interesting results.

It is the duty of the Botanist of the Station to carefully investigate, classify and describe the native plants with reference to these two points of view, and determine the properties of those plants that best fit them to meet the enforced climatic conditions.

When these properties are once determined, cultivated plants containing them may be given a test in their appropriate locality with some assurance of satisfactory results.

Illustrating this method of investigation, we need but to refer to certain reliable results that have been attained by unsystematic trials. Of the second class, according to the second method of classification, we have an example in the potato; of the third, in the onion; of the fourth in alfalfa; and also, though not definitely assigned to any class, in wheat. At the New Orleans Exposition Nevada was awarded first medals for the best quality of potatoes and wheat.

Again, it is the duty of the Botanist to investigate the properties of native plants with reference to their possible economic value and adaptability to cultivation. The great Basin will most probably furnish its own forage plant, and that from either the order Chenopodiaceæ or Leguminosæ. The investigation of the properties of plants that are readily introduced as weeds, will also doubtless lead to valuable results.

It is also especially the duty of the Botanist to make a systematic study and classification of the habits and properties of the native and introduced grasses, and to make investigations as to their adaptability to cultivation, in the experiments with which the chief condition of variation will be the quantity of water furnished them in their irrigation.

This but briefly outlines the plan of investigation by the Station of the climatic conditions and plant life of the State, with reference to their interdependence and bearing upon the art and industry of agriculture.

W. McN. Miller.

Reno, Nevada, June 21, 1888.

THE CRADLE.

LEMERY—In Reno, Feb. 26th, to the wife of Clem Lemery, a daughter.

Lost.

One strawberry roan mare, three years old, about 15 hands high; mane rather ragged, star in forehead and lump on right hind leg. Return to or address J. W Carroll, Reno. A liberal reward will be paid. feb27-1w*

NOTICE.

Land Office at Carson City, Nev., January 25, 1889

NOTICE IS HEREBY GIVEN THAT THE following-named settler has filed notice of his intention to make final proof in support of his claim, and that said proof will be made before the Register and Receiver at Carson City, Nev., on the 5th day of March, 1889, viz: William Merrill, Homestead Application No. 449, for the E½ Sec 7 Township 19 North, Range 18 East Mount Diablo meridian

He names the following witnesses to prove his continuous residence upon, and cultivation of, said land, viz: Philip Judkins, of Reno, Nev; Noah J Foxwell, of Verdi, Nev; Samuel L Laughton, f Verdi, Nev; David Russell, of Sierra Valley, Cal. O. H. GALLUP, Register.

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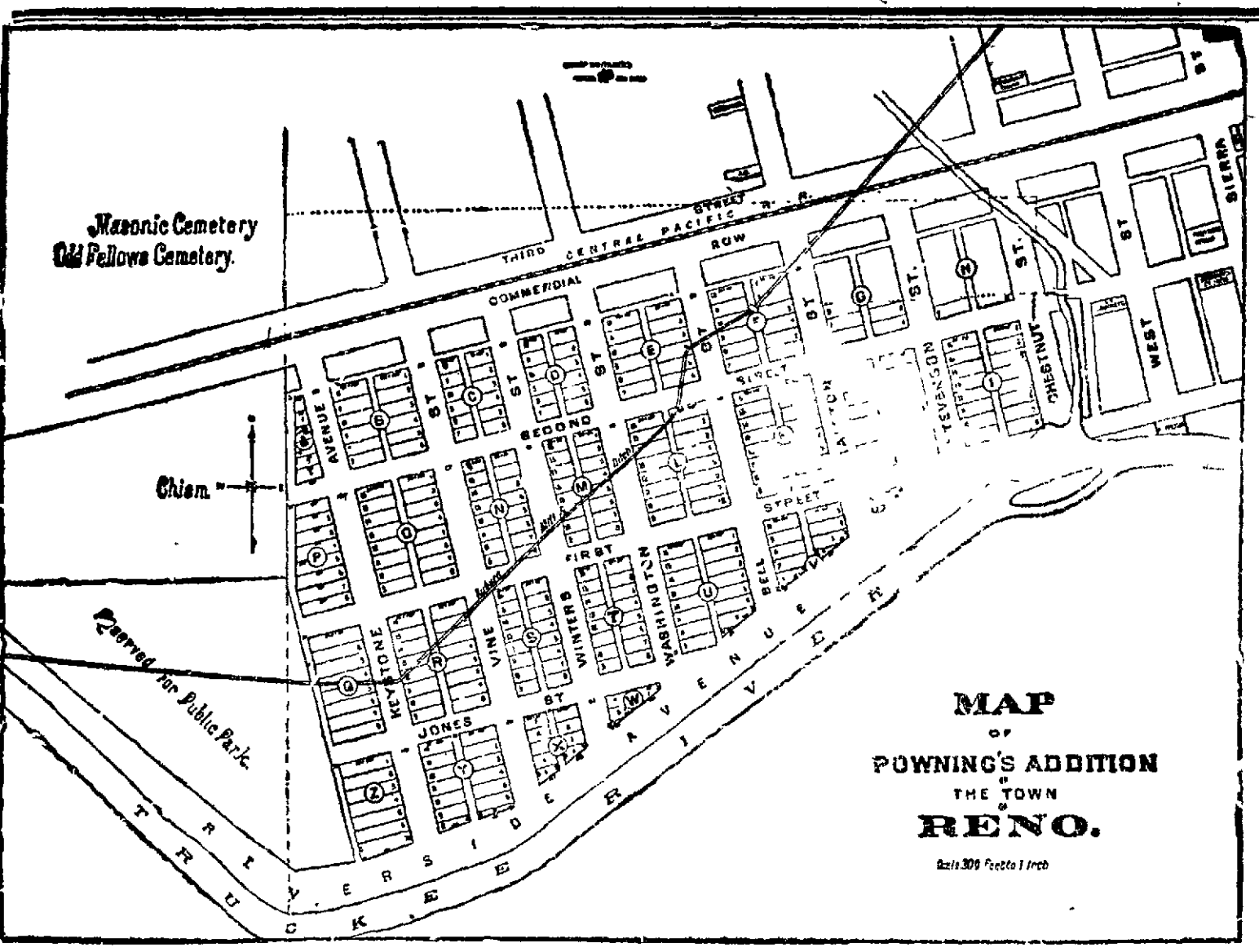

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Reno has the Bank of Nevada with $300,000 capital, and the First National Bank with $200,000 capital. It has two fine papers in the DAILY and WEEKLY NEVADA STATE JOURNAL and the Daily and Weekly Gazette.

Reno is the natural home of the Alfalfa, and therefore the great cattle headquarters of the State. Here are fed the prime beef for the California market. Reno potatoes are the best in the world, and she also excels in Strawberries and the small fruits. Reno Wheat took the first prize at the great New Orleans Exposition.

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RENO

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3d "	80	To the next Eleven, $10 each	110
4th "	70	To the next Twenty, $5 each	100
5th "	60	To the next Seventy-five, $3 each	225
6th "	50	To the next Two hundred, $2 each	400
7th "	40	To the next Five Hundred and Eighty-five, $1 each.	585
8th "	30		
9th "	25	Total	$2,000

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3. The Normal School.
4. The Business Department.
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